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10/593,834	03/23/2007	Christian Duriez	BDL-506XX	5483

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EXAMINER
PERROMAT, CARLOS

ART UNIT	PAPER NUMBER
4147	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/593,834	DURIEZ ET AL.
	Examiner	Art Unit	
	CARLOS PERROMAT	4147	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-27_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) _1-27_ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _09/22/2006, 03/23/2007_.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

REQUIREMENT FOR INFORMATION

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

In response to this requirement, please provide copies of each publication which any of the applicants authored or co-authored and which describe the disclosed subject matter of collision detection, as well as the Finite-element method used.

In response to this requirement, please provide the title, citation and copy of each publication that any of the applicants relied upon to develop the disclosed subject matter that describes the applicant's invention, particularly as to developing collision detection, as well as the Finite-element method used. For each publication, please provide a concise explanation of the reliance placed on that publication in the development of the disclosed subject matter.

In response to this requirement, please provide the title, citation and copy of each publication that was relied upon to draft the claimed subject matter. For each publication, please provide a concise explanation of the reliance placed on that publication in distinguishing the claimed subject matter from the prior art.

In response to this requirement, please state the specific improvements of the subject matter in claims 13, 14, 16, 17, 18 and 19 over the disclosed prior art and indicate the specific elements in the claimed subject matter that provide those improvements. For those claims expressed as means or steps plus function, please

provide the specific page and line numbers within the disclosure which describe the claimed structure and acts.

In responding to those requirements that require copies of documents, where the document is a bound text or a single article over 50 pages, the requirement may be met by providing copies of those pages that provide the particular subject matter indicated in the requirement, or where such subject matter is not indicated, the subject matter found in applicant's disclosure.

The fee and certification requirements of 37 CFR 1.97 are waived for those documents submitted in reply to this requirement. This waiver extends only to those documents within the scope of the requirement under 37 CFR 1.105 that are included in the applicant's first complete communication responding to this requirement. Any supplemental replies subsequent to the first communication responding to this requirement and any information disclosures beyond the scope of this requirement under 37 CFR 1.105 are subject to the fee and certification requirements of 37 CFR 1.97 where appropriate.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained may be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement.

The time period for reply to this requirement coincides with the time period for reply to

the enclosed Office action.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

2.   Claims 1-9, 12, 15, 20-22 and 27 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Duriez et al. (C. Duriez, C. Andriot, A. Kheddar, Interactive Haptics

for Virtual Prototyping of Deformable Objects: Snap-In Tasks Case, presented at

EuroHaptics '03, July 6th-9th 2003, "Duriez '03" hereinafter).

        Regarding claim 1, Duriez '03 discloses a "method of interactively simulating

contact between a deformable first object and a second object using a simulated model

with a predetermined sampling time step" (see Abstract, and see also section 4.1,

footnote 1 for collision detection at every time-step) "the method being characterized in

that: (a) the parameters describing the physical characteristics of each of the objects,

such as the geometry and the mechanics of the materials of each of the objects, are

calculated beforehand and stored in a memory" (see sub-section 3.2, 3rd par. for

calculating offline the rigidity matrix of a complex object), "(b) at the beginning of each

sampling time step of the simulated model, a real-time analysis of the inherent behavior

of each object is carried out at the level of each object in order to predict the positions,

speeds and accelerations of that object in application of a free movement that does not

take account of any subsequent contacts" (see section 4.1, footnote 1, for a description

of collision detection based on interpenetration at each time step. Because it is allowed

for interpenetration to be detected before collision, it is inherent that the position of the

simulated objects is first calculated without considering the effects of the collision), "(....)

(d) in each sampling time step of the simulated model, parameters representing the

physical characteristics of the objects and the description of the collisions are

repatriated in real time for each group of collisions to determine, for each instance, the

solution to the Signorini problem that governs contact between two objects in the case

of pure relative sliding" (see section 2.2, 1st paragraph, for solving the Signorini

problem, and calculating the forces and constraints for the contact; see also section 3.1,

1st paragraph for using the pre-calculated stiffness of the object in the calculations), "(e)

at the end of each sampling time step of the simulated model, a real-time display of the

inherent behavior of the object following the collision is effected at the level of each

object" (inherently, since that is the purpose of the method, see abstract and Fig. 5),

"and (f) all real-time processing is effected with a computation time step shorter than the

sampling time step of the simulated model so as to define an interactive simulation in

which the user can intervene directly during simulation" (see section 2.1, 4th par. for

meeting real-time calculation constraints as a general concern in physical simulation. It

is inherent to the interactive application as disclosed that all calculations must be

performed in a time shorter than each frame rendering time in order to provide the
visual response to a user's actions through a haptic interface).

Duriez'03 does not explicitly teach that "in each sampling time step of the
simulated model, pairs of objects that are detected as intersecting are analyzed in real
time at the level of an overall scene including the objects liable to come into contact,
and a list of groups of collisions is established that contains a string of objects in
collision and a description of the collisions". However, as discussed above, Duriez'03
discusses detecting a collision between a pair of objects at each time step. Because
more than one such collision can occur at each time step, it would have been obvious to
one of ordinary skill at the time of the invention to process all such collisions and store
them in a list for collision processing.

Regarding claim 2, Duriez'03 further discloses that "during the step a) of
calculating beforehand parameters describing the physical characteristics of each of the
objects, a finite element type description of deformations is used for the parameters
describing the mechanics of the materials, with matrices being filled and inverted,
systems of equations being solved, and data being stored in memory" (see section 3 for
a detailed description of using the finite element method for transforming the pre-
calculated stiffness matrix using matrices, which are filled and inverted. Inherently,
because the method is to be performed by a computer, the results are stored in
memory).

Regarding claim 3, Duriez'03 further discloses that "characterized in that each
object is described in a rest configuration as a (…) set of tetrahedra describing the

interior of the object" (see section 3.2, first paragraph for using tetrahedra in order to represent the interior of an element).

Duriez'03 does not explicitly disclose that each objects surface is described as a set of triangles. The Examiner however takes the official notices that most standard mesh formats describe an objects surface a set of triangles, since triangles represent the simplest planar form. Therefore, it would have been obvious to one of ordinary skill in the art to use models that describe their surface using a set of triangles, if for no other reason, in order to use the models created by standard 3D modeling tools.

Regarding claim 4, Duriez'03 does not teach that "each triangle is described by three points placed in an order such that normals are calculated that are invariably directed towards the exterior of the object". The Examiner however takes the official notice that each standard 3D mesh object defines the order of evaluation of each vertex of each triangle, either clockwise or counter-clockwise, so that the normal to the triangle always points outward. This is necessary most frequently for the application of lighting algorithms, which employ the outward normal to the surface in order to compute the reflection of light on the surface. Therefore, it would have been obvious to one of ordinary skill in the art to use models that describe their surface using a set of triangles, and that also describe an order of evaluation of vertices for these triangles so that the normal points outward, if for no other reason, in order to use the models created by standard 3D modeling tools, and to be able to apply lighting algorithms to the surfaces simulated.

Regarding claim 5, Duriez'03 further teaches that "the deformations of the objects are interpolated by the finite element method using a linear tetrahedral mesh" (see section 3.2, 1st paragraph).

Regarding claim 6, Duriez'03 further teaches that "in each computation time step the explicit forces applied to an object, which are already known at the start of the computation step, are integrated during the step b) at object level to define the movements of the object that they generate, whereas the values of the implicit contact forces, which depend on the movement of the objects in the computation time step, are determined during the step d) of seeking the solution to the Signorini problem at the level of an overall scene" (see discussion above for using the known forces in order to generate a collision; see section 2.2 1st paragraph for characterizing subsequent forces using calculation to solve the Signorini problem).

Regarding claims 7 and 24, Duriez' 03 further teaches that "during the step c) of analysis at the level of an overall scene, the existing intersections between the objects of the scene are detected geometrically in order to extract from pairs of elements of intersecting objects a length and a direction of interpenetration between the two elements of a pair of elements of objects" (see section 4.1, 2nd paragraph for obtaining for each collision an interpenetration length and direction).

Regarding claim 8, Duriez'03 also teaches that "during the step c) of analysis at the level of an overall scene, to extract from pairs of elements of intersecting objects a length and a direction of interpenetration between the two elements of a pair of elements of objects, an intermediate movement of the objects between the preceding

computation step and the current computation step is also taken into account in order to

compute a preferential direction of interference between the objects" (see section 4.1,

3rd paragraph, for computing a projection of the forces along the surface normal towards

the surface, that is, of situating the forces at the time of impact rather than at the

detected time of interpenetration).

Regarding claim 9, Duriez'03 further teaches that "during the step d) of seeking

the solution to the Signorini problem, the extreme points of application of the contact

force between the two objects in collision are reconstructed if those extreme application

points have not been determined during the preceding step" (see section 4.1, 3rd

paragraph, for computing a projection of the forces along the surface normal towards

the surface).

Regarding claim 12, Duriez'03 further teaches that "(....) coordinates are used to

distribute the displacements and the forces of the points of application of the contact

force by effecting a linear interpolation for a finite element modeling process" (see

section 4.1, 3rd paragraph, for computing a projection of the forces along the surface

normal towards the surface, see section 4.2 for the use of finite element interpolation).

Duriez'03 does not disclose that barycentric coordinates are used. However the

Examiner takes the official notice that barycentric coordinates are well-known in the art

and commonly used to refer to positions within a triangle. Because the surfaces of the

models are composed of triangles, as mentioned above, it would have been obvious to

one of ordinary skill in the art at the time of the invention to use barycentric coordinates

in order to describe the forces at the surface.

Regarding claims 15 and 27, Duriez'03 further discloses that "when the points of
application of the contact forces between two objects in collision have been determined,
during the step d) the mechanical characteristics of the objects are transferred into the
defined contact space in which the whole of a group of m contacts with n objects is
processed, where m and n are integers" (see section 4.1, 3rd paragraph, for computing
a projection of the forces along the surface normal towards the surface, and oriented
towards the outside, where this calculation is performed for each object in a collision,
and for each vertex within the deformable mesh, see section 4.1, 2nd paragraph).

Regarding claim 20, Duriez'03 further teaches "coupling with a haptic interface
module to produce haptic sensation feedback to a mechanical system by means of
which an operator manipulates the objects in a virtual scene" (see abstract and section
5.2).

Regarding claim 21, Duriez'03 teaches a "system for the interactively simulating
contact between a deformable first object and a second object using a simulated model
with a predetermined sampling time step" (see Abstract, and see also section 4.1,
footnote 1 for collision detection at every time-step), "the system being characterized in
that it comprises: (a) a module for calculating beforehand parameters describing the
physical characteristics of each of the objects, such as the geometry and the mechanics
of the materials of each of the objects" (see sub-section 3.2, 3rd par. for calculating
offline the rigidity matrix of a complex object), "(b) a memory for storing parameters
previously calculated in the computation module" (inherently, since the method
disclosed is to be performed by a computer, memory is needed to store results), "(c) a

coupling module to a user interface comprising a mechanical system held by a user to

exert virtual forces on said objects in a scene of the simulated model" (see abstract and

section 5.2), "(d) a display screen for displaying said objects represented in the form of

meshes" (see Fig. 6, see also section 4.1, 2nd paragraph the objects represented by a

mesh), " (e) a central processor unit associated with input means, comprising at least:

e1) an object analysis module for analyzing in real time at the level of each object the

inherent behavior of the object in order to predict the positions, speeds and

accelerations of that object in application of a free movement that does not take account

of any subsequent contacts" (see section 4.1, footnote 1, for a description of collision

detection based on interpenetration at each time step. Because it is allowed for

interpenetration to be detected before collision, it is inherent that the position of the

simulated objects is first calculated without considering the effects of the collision; see

section 5.2 and section 5.1, for a description of a computer used in the method as well

as haptic input means), "e2) an analysis module for an overall scene including the

objects liable to come into contact, for analyzing in real time pairs of objects that are

detected to be interacting (....)" (see section 4.1, footnote 1, for a description of collision

detection based on interpenetration at each time step), "e3) a module for the real time

repatriation, for each group of collisions, of the parameters representing the physical

characteristics of the objects and the description of the collisions, for determining, for

each instance, the solution to the Signorini problem that governs contact between two

objects in the case of pure relative sliding" (see section 2.2, 1st paragraph, for solving

the Signorini problem, and calculating the forces and constraints for the contact; see

also section 3.1, 1st paragraph for using the pre-calculated stiffness of the object in the

calculations), "e4) a module for processing each object for real time display at the level

of each object of the inherent behavior of that object following a collision" (inherently,

since that is the purpose of the method, see abstract and Fig. 5), "and e5) means for

determining a computation step shorter than the sampling time step of the simulated

model so as to define an interactive simulation" (see section 2.1, 4th par. for meeting

real-time calculation constraints as a general concern in physical simulation. It is

inherent to the interactive application as disclosed that all calculations must be

performed in a time shorter than each frame rendering time in order to provide the

visual response to a user's actions through a haptic interface).

Duriez'03 does not explicitly teach establishing "a list of groups of collisions that

contains a string of objects in collision and a description of the collisions". However, as

discussed above, Duriez'03 discusses detecting a collision between a pair of objects at

each time step. Because more than one such collision can occur at each time step, it

would have been obvious to one of ordinary skill at the time of the invention to process

all such collisions and store them in a list for collision processing.

Regarding claim 22, Duriez'03 further "means for producing haptic sensation

feedback to the user interface" (see Abstract).

3.   Claims 10, 11, 13, 14, 16-19, and 23-26 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Duriez et al. (C. Duriez, C. Andriot, A. Kheddar, Interactive

Haptics for Virtual Prototyping of Deformable Objects: Snap-In Tasks Case, presented

at EuroHaptics '03, July 6th-9th 2003, "Duriez '03" hereinafter) as applied to claims 1, 9,

15 and 27 above, and further in view of Duriez et al. (C. Duriez, C.Andriot, A. Kheddar,

A Multi-Threaded Approach for Deformable/Rigid Contacts with Haptic Feedback,

presented at Haptics'04, 27th-28th March 2004, "Duriez'04" hereinafter).

Duriez'04 includes an admission of prior art by the Applicants and is used here to

provide proof that portions of the claims were known to the Applicants as prior art.

Regarding claim 10, Duriez'03 does not disclose that "during the step d) of

seeking the solution to the Signorini problem, in the case of a segment-segment

intersection of two triangular objects, the two points selected to constitute the extreme

points of application of the contact force between the two objects in collision are

situated at the intersection of each of the two segments ($P.sub.1P.sub.2$,

$Q.sub.1Q.sub.2$) with the plane formed by the face of the triangle in the intersection". In

Duriez'04, however, the applicants admit that the collision algorithm used for the

triangles in question is an application of the Provot algorithm, see section 3.2, and that

the calculations performed use the finite element interpolation algorithm as disclosed in

Duriez'03, see discussion above.

Regarding claim 11, Duriez'03 does not disclose that "during the step d) of

seeking the solution to the Signorini algorithm, in the case of a point-face intersection of

two triangular objects, a first point selected to constitute a extreme point of application

of the contact force between the two objects in collision is the point of the intersection

whereas the second extreme point of application of the contact force between the two

objects in collision is the projection of the first extreme point onto the face of the triangle

in the intersection", although Duriez'03 does disclose projecting the forces along the

normal to the surface of an object, see section 4.1. In Duriez'04, however, the
applicants admit that the collision algorithm used for the triangles in question is an
application of the Provot algorithm, see section 3.2, and that the calculations performed
use the finite element interpolation algorithm as disclosed in Duriez'03, see discussion
above.

Regarding claims 25 and 26, Duriez'03 further teaches that "(….) coordinates are
used to distribute the displacements and the forces of the points of application of the
contact force by effecting a linear interpolation for a finite element modeling process"
(see section 4.1, 3rd paragraph, for computing a projection of the forces along the
surface normal towards the surface, see section 4.2 for the use of finite element
interpolation).

Duriez'03 does not disclose that barycentric coordinates are used. However the
Examiner takes the official notice that barycentric coordinates are well-known in the art
and commonly used to refer to positions within a triangle. Because the surfaces of the
models are composed of triangles, as mentioned above, it would have been obvious to
one of ordinary skill in the art at the time of the invention to use barycentric coordinates
in order to describe the forces at the surface.

Regarding claims 13 and 14, Duriez'03 does not teach neither of the formulae
disclosed to obtain the distance of interpenetration as claimed. In Duriez'04, however,
the applicants admit that the collision algorithm used for the triangles in question is an
application of the Provot algorithm, see section 3.2, and that the calculations performed

use the finite element interpolation algorithm as disclosed in Duriez'03, see discussion above.

Regarding claim 16, Duriez'03 does not teach that "during the step d) the mass and inertia of an object are considered lumped together at its centre of mass". The Examiner however takes the Official Notice that in analyzing the physical behavior of an object it is traditional to consider its mass and inertia, as being applied at the object's center of mass, and therefore it would have been obvious to one of ordinary skill at the time of the invention to use this approach in calculating the overall physical behavior of the object. Duriez'03 teaches using the finite element method to transfer the forces of the collision to the contact space, see section 4.2; although the formula claimed is not disclosed explicitly, it would have been obvious to one of ordinary skill in the art to obtain this formula or its equivalents, by employing known methods, as disclosed in section 4.2. In Duriez'04, the applicants admit that their work is an adaptation of the work of Provot (see section 3.1), Kikuchi and Baraff (see section 3.3), Zhuang (see section 3.4), and pivotal method and Lemke's algorithm (see section 3.5).

Regarding claim 17, 18 and 19 Duriez'03 does not explicitly teach the formulae claimed, however, Duriez'03 provide the general formulae from which these formulae can be obtained, see sections 3.1, 3.2, 4.1, and 4.2. In Duriez'04, the applicants admit that their work is an adaptation of the work of Provot (see section 3.1), Kikuchi and Baraff (see section 3.3), Zhuang (see section 3.4), and pivotal method and Lemke's algorithm (see section 3.5).

4.   Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Duriez

et al. (C. Duriez, C. Andriot, A. Kheddar, Interactive Haptics for Virtual Prototyping of

Deformable Objects: Snap-In Tasks Case, presented at EuroHaptics '03, July 6th-9th

2003, "Duriez '03" hereinafter) as applied to claim 21 above, and further in view of

Debunne et al. (G. Debunne, M. Desbrun, M. Cani and A. Bahr, Dynamic Real-Time

Deformations using Space and Time Adaptive Sampling, COMPUTER GRAPHICS.

SIGGRAPH 2001. CONFERENCE PROCEEDINGS. LOS ANGELES, CA, AUG. 12 -

17, 2001, COMPUTER GRAPHICS PROCEEDINGS. SIGGRAPH, NEW YORK, NY:

ACM, US, 2001 (2001-08-12), pages 31-36, provided by applicant, "Debunne"

hereinafter).

        Regarding claim 23, Duriez'03 does not teach "that the computation step

corresponds to a frequency greater than or equal to approximately 500 Hz". Debunne,

however, teaches that in order to obtain appropriate haptic interaction the processing

must occur at over 400 Hz, see section 4.2. Because both Duriez'03 and Debunne

teach methods to simulate real-time object deformations using haptic interfaces, it

would have been obvious to one of ordinary skill in the art, after normal experimentation

of the method disclosed in Duriez'03 to come to the conclusion that the frequency

needed was above 500 Hz. This conclusion is largely dependent on the complexity of

the objects used and the level of detail employed as well as on the capabilities of the

underlying hardware and therefore represents a design choice for the developer.

Conclusion

5.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Eurohaptics 2003, http://www.eurohaptics.vision.ee.ethz.ch/2003.shtml, discloses the date at which the reference used in this Action was presented.

This Office action has an attached requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the attached requirement for information. The time period for reply to the attached requirement coincides with the time period for reply to this Office action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CARLOS PERROMAT whose telephone number is (571) 270-7174. The examiner can normally be reached on M-TH 8:30 am- 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kieu-Oanh Bui can be reached on (571) 272-7291. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KIEU-OANH BUI/   CARLOS PERROMAT
Supervisory Patent Examiner, Art Unit 4147   Examiner
                                                                        Art Unit 4147

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